

The Magic School Bus

on the Ocean Floor



Scholastic 0-590-41431-3 \$4.99 CAN

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On the Ocean Floor





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On the Ocean Floor

By Joanna Cole / Illustrated by Bruce Degen



The ocean animals and plants are labeled only at their first appearance within the story.



To Margo, Bruce, Emily, and Beth, with love

J.C.

For Mom and Dad and summer days at the beach

B.D.



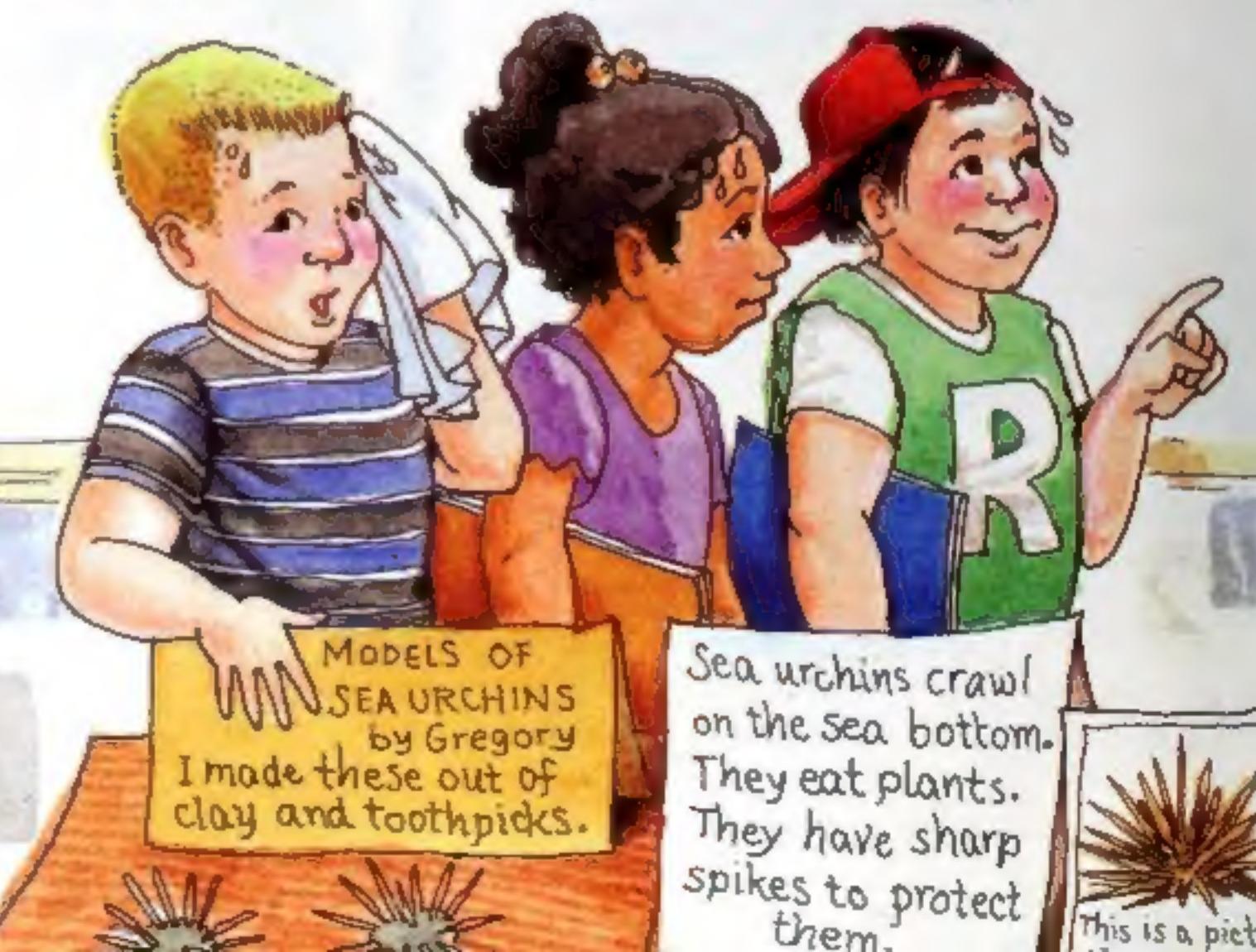


It was the end of the day,
and it was hot in school.
We had been working for hours
on our ocean science projects.
All our work made Ms. Frizzle very happy.
But it made us very tired and hot.

WOW. IT'S
HOT TODAY.

NOT MS. FRIZZLE'S
DRESS.

YEAH, IT'S
COOL, MAN.



DOESN'T LEARNING
ABOUT OCEANS MAKE
YOU HAPPY, ARNOLD?

ACTUALLY,
IT MAKES ME
FEEL KIND OF
CRABBY.



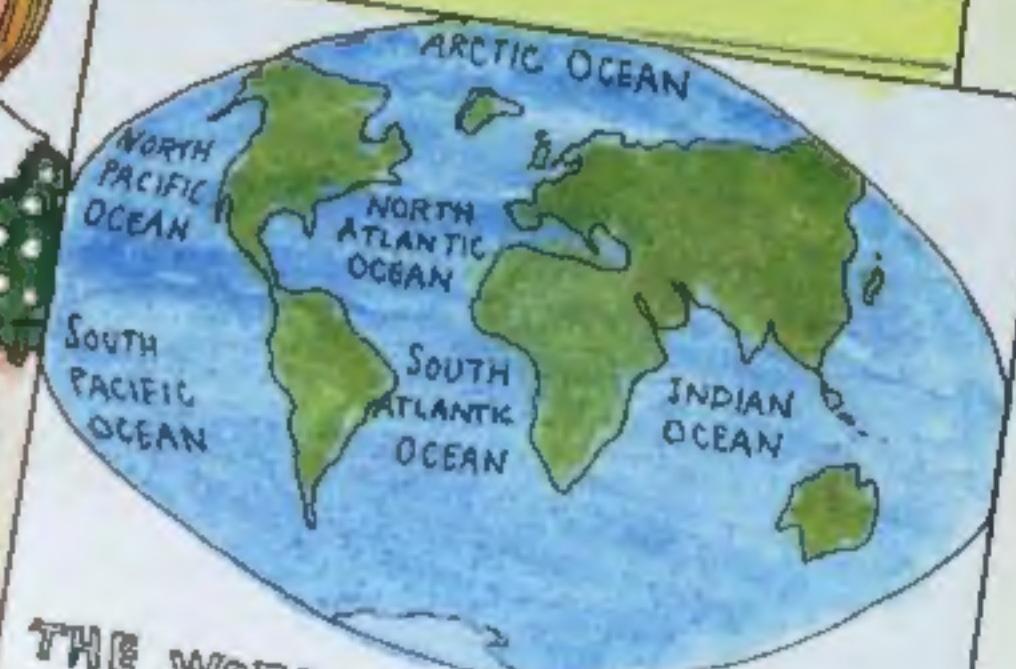
HERMIT CRABS LIVE IN SNAIL SHELLS.
A hermit crab finds an empty snail shell.
The crab moves in.
When the crab gets too big, it looks for a bigger shell.

WHAT WE FEED HERMAN
1. Raw Fish, chopped up
2. Raw Shrimp, with the shell left on

ALL THE OCEANS OF THE WORLD ARE REALLY ONE HUGE OCEAN!

by Rachel

The oceans of the world are all connected.
Together they form one world ocean.



THE WORLD OCEAN

EARTH IS A WATERY PLANET

by Wanda

There is more water than land on earth.
Oceans cover almost three-fourths of the planet!

SWIMMERS IN THE SEA

by Shirley, John and Ralph



FISH - Sweeps tail from side to side

WHALE Moves tail up and down



JELLYFISH - Opens body like an umbrella, then closes rapidly to jet upward



SQUID - takes in water and forces it out to jet forward or backward



This is my sculpture of a
HUMUHUMUNUKUNUKUAPUA'A
A FISH THAT LIVES IN HAWAII
(THE NAME IS LONGER THAN THE FISH)
—ALEX

We were putting the finishing touches on a display about how ocean animals swim when someone said, "I wish we could go swimming."



SCALLOP - opens and closes shell rapidly to move.

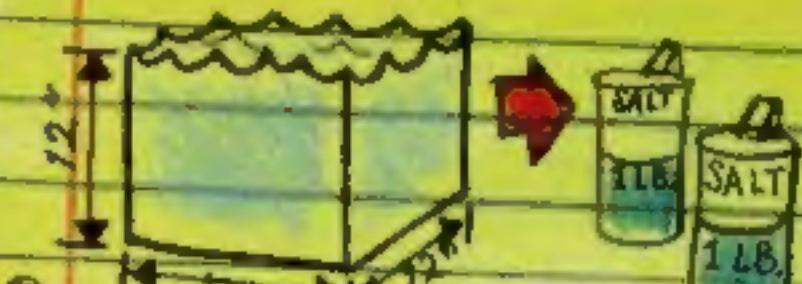
Chart of the Pacific Seas.

Ms. Frizzle looked up.
Without warning, she said,
"As a matter of fact, children,
I've been planning a class trip to the ocean
for tomorrow."
Everybody cheered.
Sometimes having a weird teacher isn't so bad!



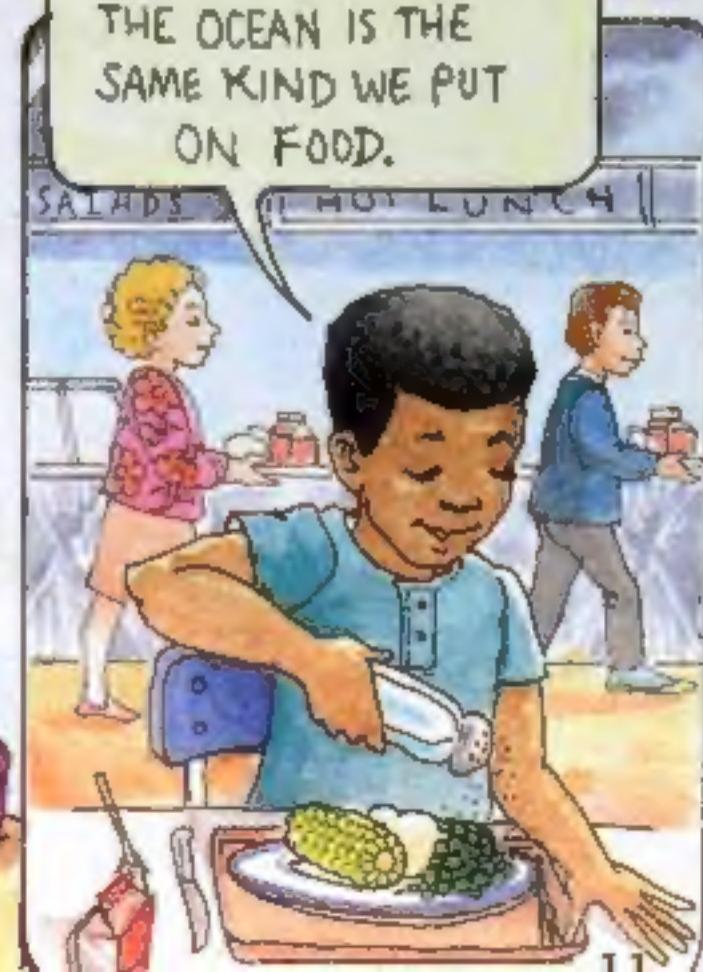
WHY IS THE OCEAN SALTY?

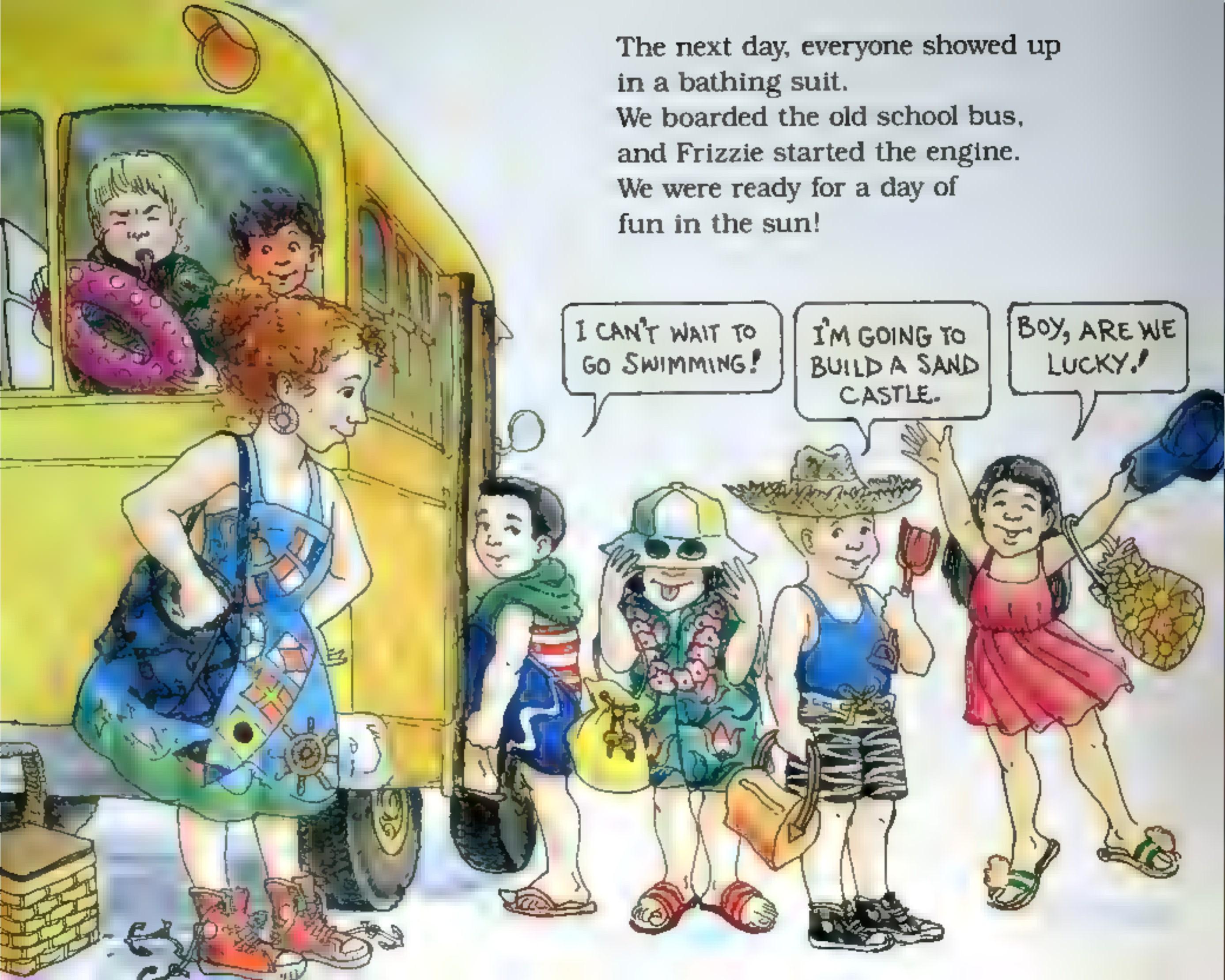
- by Tim
- Much of the salt in the ocean water comes from rocks. Rocks have salt in them. When rocks are worn down by water, the salt goes into the water.



One Cubic foot of seawater has over 2 pounds of salt in it.

MOST OF THE SALT IN THE OCEAN IS THE SAME KIND WE PUT ON FOOD.





The next day, everyone showed up
in a bathing suit.
We boarded the old school bus,
and Frizzie started the engine.
We were ready for a day of
fun in the sun!

I CAN'T WAIT TO
GO SWIMMING!

I'M GOING TO
BUILD A SAND
CASTLE.

BOY, ARE WE
LUCKY!

When we finally came to the beach,
we wanted to jump off the bus.
But guess what?
Ms. Frizzle didn't stop.
She kept right on going —
past the lifeguard station,
across the sand,
and down to the water's edge.

WHERE DOES SAND COME FROM?

by Phoebe

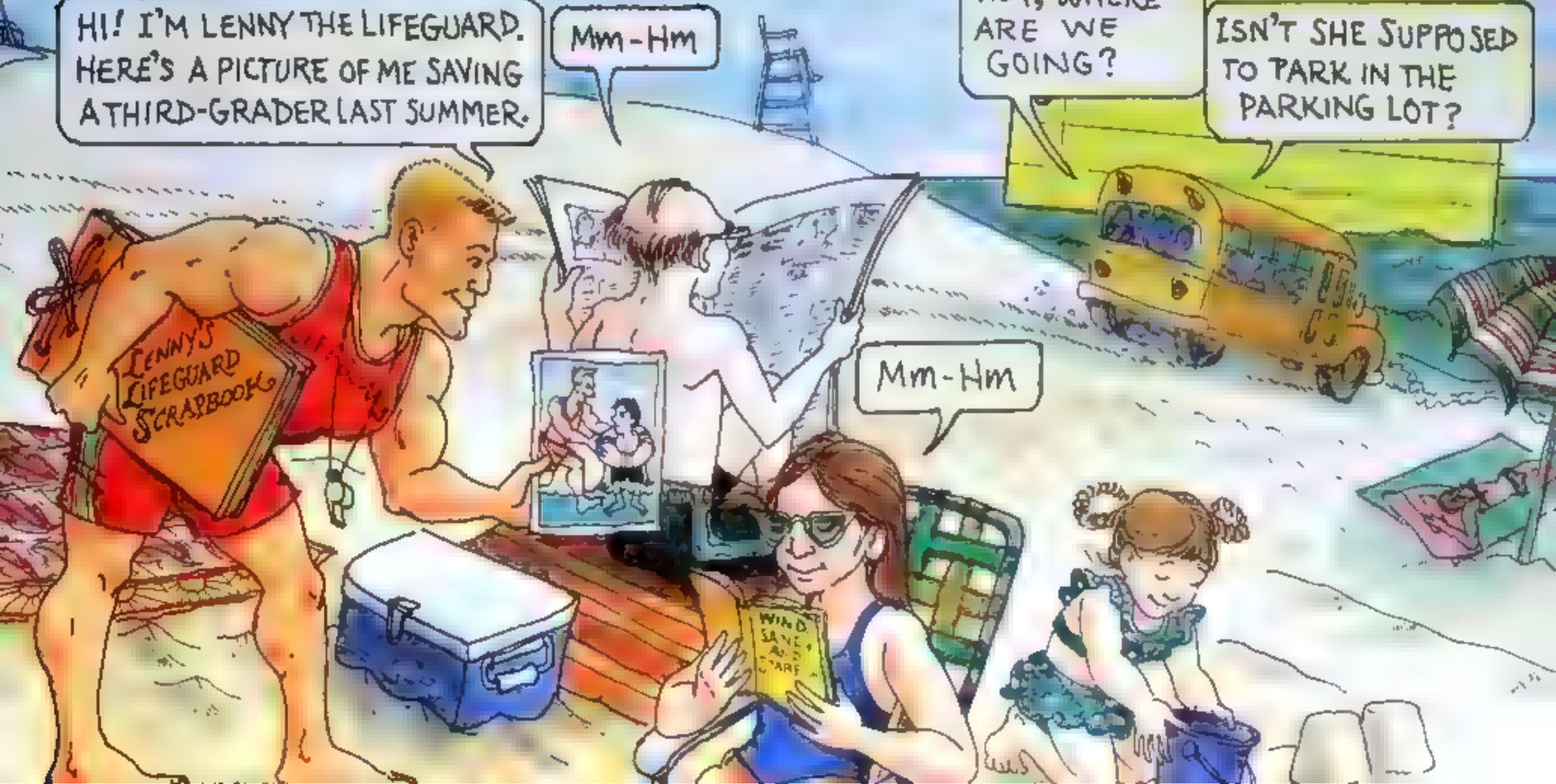
Sand is formed when rocks break apart and crumble into bits. Each grain of sand is really a tiny piece of rock or shell.

HI! I'M LENNY THE LIFEGUARD.
HERE'S A PICTURE OF ME SAVING
A THIRD-GRADE LAST SUMMER.

Mm-Hm

HEY, WHERE
ARE WE
GOING?

ISN'T SHE SUPPOSED
TO PARK IN THE
PARKING LOT?



TIDES RISE AND FALL

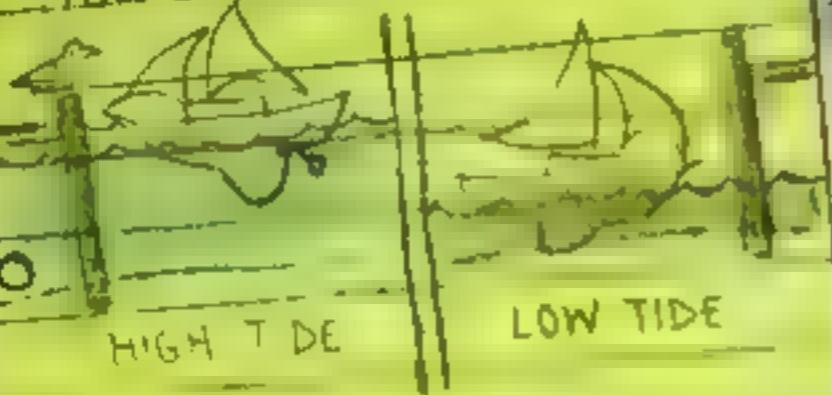
- EVERY DAY

by Rachel

When the water near shore rises and gets deep,

it is high tide.

- When the water falls and gets shallow, it is low tide.



- Tides are caused mostly by the pull of the moon's gravity on the earth and its oceans.

"We are now in the intertidal zone," said Ms. Frizzle.

"That is the part of shore that is covered with water at high tide, and uncovered at low tide."

HERE I AM SAVING A GRANDMOTHER... AND THIS IS MY FAMOUS RESCUE OF MUFFY, A BELOVED FAMILY PET.

MM-HM

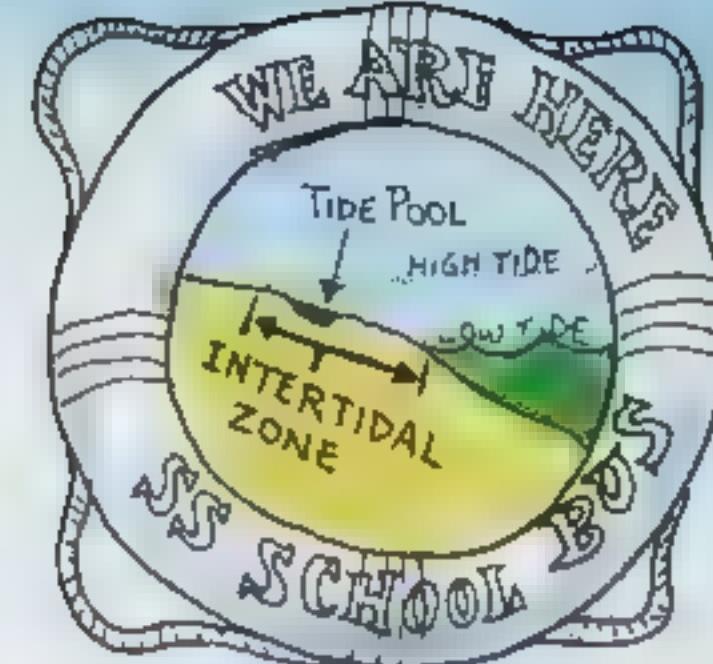
MM-HM



Out the windows we saw tide pools —
puddles of water left on shore
when the tide goes out.

We were hoping the Friz would let us out,
but no such luck.

She kept driving full speed ahead.



SHE SAID WE WERE GOING TO THE BEACH

No, SHE DIDN'T. SHE SAID WE WERE
GOING TO THE OCEAN.

I GUESS SHE REALLY MEANT IT!



Periwinkles

Barnacles

Sea Stars

Mussels

Seaweeds

Limpets

Green Crabs

Sea Urchins

WHAT MAKES WAVES?
by Frizzie

Most of the waves we see are caused by wind. The stronger the wind, the bigger the waves.

A BREEZE MAKES LITTLE RIPPLES.

A STRONG WIND MAKES LARGE WAVES.

As the bus splashed through the waves, the lifeguard blew his whistle. Frizzie didn't stop, so he came rushing out to rescue us.

PARDON ME, PLEASE. I HAVE TO RESCUE A SCHOOL BUS.



Suddenly a mysterious wave rose up.
Ms. Frizzle opened the door of the bus,
and the lifeguard was swept inside.
Outside the windows
we saw nothing but rushing water.
We screamed and closed our eyes.

SEA GULL

CLASS, THE BEST WAY
TO LEARN ABOUT THE OCEAN
IS TO SEE IT CLOSE UP.

NOT THIS CLOSE!

HI. I'M LENNY THE LIFEGUARD.

OH GREAT.
I FEEL SAFER
ALREADY.

WE'RE
GOING
UNDER!

When we finally opened our eyes,
everything was quiet.
We were under the ocean,
and there had been a few small changes.
The bus had turned into a submarine,
and everyone was wearing a diving suit.
We should have known.
We were on another one of Ms. Frizzle's
crazy class trips!

DON'T WORRY KIDS, I'LL SAVE
YOUR LIVES. THAT'S MY JOB.

MAYBE LATER.

MS. FRIZZLE'S JUST
GETTING STARTED.

NOTHING CAN
STOP HER NOW.

Squid

Flounder

Right away, Ms. Frizzle started talking about the ocean.

"We are now passing over the continental shelf," she said.

"That's the area that stretches from the shore to where the water is four hundred to six hundred feet deep."

CLASS, THE WATER IS GETTING DEEPER AND DEEPER.

OCEAN SCIENCE IS TOO DEEP FOR ME!

Grunts

WHAT IS THE CONTINENTAL SHELF?

- SHELF?

by Carmen

All around the edge of the world's continents, the land slants down and is covered by ocean water. This underwater land is called the continental shelf.

A NEW WORD

- by Dorothy Ann

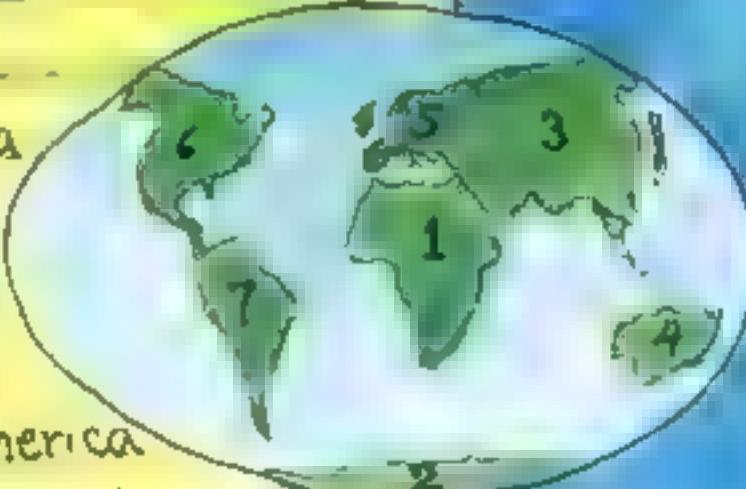
A continent is one of the seven main masses of land on the earth.

- 1. Africa
- 2. Antarctica
- 3. Asia
- 4. Australia
- 5. Europe
- 6. North America
- 7. South America

WE ARE HERE

CONTINENTAL SHELF

SS SCHOOL BUS



How can fish breathe underwater?

by Amanda Jane

People have lungs that take oxygen from air. Fish have gills that can take oxygen from water.



Water flows into the fish's mouth, then the gills, and out through slits in the fish's sides.

Ms. Frizzle decided this was a good moment for us to get out of the bus. Thank goodness we had air tanks! All around us were fish, fish, and more fish. "Many kinds of fish swim in large groups called schools," said Ms. Frizzle.



Down below, on the muddy bottom,
lobsters were catching crabs.
Starfish used their arms
to pry open clamshells.
And jellyfish floated past,
catching small fish
with their stinging tentacles.
The ocean was teeming with life!



Q: WHEN IS A FISH

NOT A FISH?

A: WHEN IT'S A JELLYFISH!

by Gregory

A true fish has a
backbone, gills and fins.
Some animals are

called "fish" but they
are not. Actually, they
are invertebrates, animals
without backbones.

Here are some of them:

Q

Jellyfish



Q

Sea Star

(also called starfish)



Q

shellfish



SCALLOP MUSSEL SNAIL CRAB

Q

Sea Star



CLAM

WHAT IS PLANKTON?

by Arnold

- Plankton is a mass of plants and animals that float near the surface of the ocean. Most plankton are very small. Many cannot be seen without a microscope.

Ms. Frizzle said there was

life in the water

we couldn't even see.

She pulled out a microscope

and made us look at seawater.

Under the microscope we saw strange creatures.

"Girls and boys," said Ms. Frizzle,

"these tiny living things are called plankton."

THERE ARE TWO KINDS OF PLANKTON, CHILDREN. SOME ARE PLANTS AND OTHERS ARE ANIMALS.

WOW! A PLANKTON ANIMAL IS EATING A PLANKTON PLANT.

OH,
YUMMY.



We tried to listen, but we felt nervous.
We noticed some dark shapes
coming closer and closer.



LARGE FISH eat MIDDLE-SIZE FISH eat SMALL FISH eat TINY WATER ANIMALS eat MICROSCOPIC PLANKTON

HOW THE SUN FEEDS OCEAN ANIMALS

by John

Plankton plants make food by using energy from the sun. Plankton animals eat the plankton plants. Larger animals eat the plankton animals. This is called a food chain. Without the sun shining on plankton plants most ocean animals could not exist.

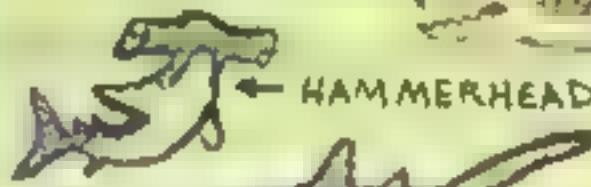
SHARKS ARE FISH

by Molly

- Most sharks are fast swimmers with razor-sharp teeth. Usually they eat ocean animals like crabs, fish, seals— even other sharks.

SOME KINDS OF SHARKS

- GREAT WHITE → 



THRESHER → 



- A DIFFERENT KIND OF SKELETON

by Ralph

- Sharks do not have bones like other fish. Their skeleton is made of cartilage. This is the same bendable material that is in your ears and the tip of your nose.

Oh, no! The shapes were tiger sharks!

Ms. Frizzle told us not to worry.

She said most sharks will not eat people.

"The number of people killed by sharks every year is very, very small,"

said Ms. Frizzle.

We panicked anyway!

[Tiger sharks]

HUMANS ARE NOT THE MAIN DIET OF TIGER SHARKS BUT THEY MAY ATTACK IF HUMANS ARE NEARBY.

UH-OH! WE'RE NEARBY!



Then an enormous whale shark slid by.

"Whale sharks never hurt people.

They eat nothing but plankton,"

said Ms. Frizzle.

The giant shark swam down, and we went along.

We were leaving the continental shelf, following

a steep cliff called the continental slope.

We were on our way to the deep ocean floor.



• WHALE SHARKS ARE NOT WHALES

by Michael

Whale sharks are fish like other sharks. They were named after whales because they are the biggest of all sharks.

IS THE OCEAN FLOOR FLAT?

by Phil

Flat plains cover much of the ocean floor, but not all of it. The deepest valleys and the tallest mountains on earth are found under the ocean.

An Underwater Valley is called a trench

the deepest trench yet found is 7 miles down

ISLANDS ARE MOUNTAIN TOPS

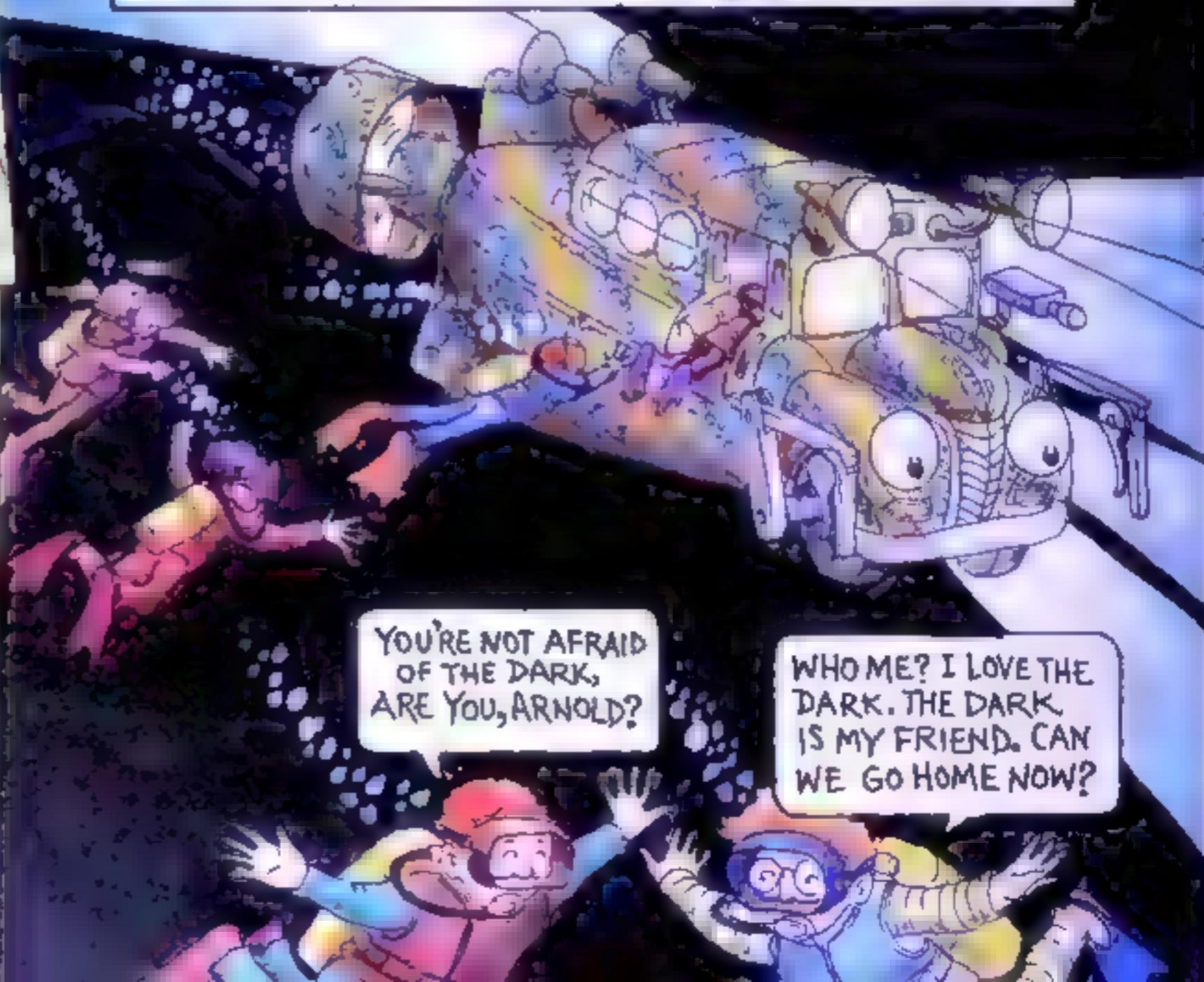
by Arnold

When the top of an under-sea mountain is above the surface, it is called an island.

LOOK!
AN ISLAND!

LOOK!
A MOUNTAIN!

After a while, the whale shark swam away, but the Friz kept going down. The water was bitter cold and pitch-dark. Sunlight could not shine down so deep. Ms. Frizzle switched on her flashlight. As we swam onto the bus, we noticed that it had changed again.



This time it was a *submersible*, a vehicle made for exploring the deep ocean floor. "The pressure down here would crush an ordinary submarine," Frizzle explained, and she drove all the way to the bottom. "There is not enough food here for large animals," Ms. Frizzle told us. "Most deep-sea fish are tiny." The deep ocean floor was as empty as an underwater desert!

THOSE TINY DEEP-SEA FISH CAN GLOW IN THE DARK.

THEY HAVE THEIR OWN SPECIAL LIGHT, JUST AS FIREFLIES DO ON LAND.

ANGLER FISH

LANTERN FISH

SWALLOWER

HATCHET FISH

WHY PLANTS CANNOT GROW ON THE DEEP OCEAN FLOOR

by Wanda

Plants need light to grow. It is too dark for plant life on the ocean bottom.

WHAT DO OCEAN-FLOOR ANIMALS EAT?

by Shirley

Some deep-sea animals depend on bits of food that sink from the upper ocean. Others use their special lights to attract prey.

WE ARE HERE

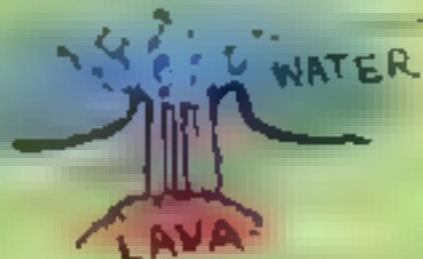
Shelf
Slope
Deep Ocean Floor

SCHOOL BUS

WHAT CAUSES HOT-WATER VENTS?

by Alex

- A vent is formed when seawater seeps into cracks in the ocean floor. The water touches super-hot rocks inside the earth.
- Then the hot water shoots up out of the vent.



HOW FOOD IS MADE AT A VENT

by Shirley

- Special bacteria manufacture their own food using heat energy and hydrogen sulfide gas from the vent. This food supports much of the life at the vent.

Then up ahead, we saw a spot that was full of life. It looked like an undersea garden with all kinds of strange animals in it.

"This is a hot-water vent, class," said the Friz.

"A vent is an opening in the ocean floor. Flowing from the vent is super-hot water mixed with hydrogen sulfide gas."

AT A HOT-WATER VENT THERE IS ENOUGH FOOD FOR MANY LARGE ANIMALS.

THESE TUBE WORMS LOOK LIKE HUGE LIPSTICKS



HUGE CLAMS (1 FOOT OR MORE)

GIANT TUBE WORMS (8 TO 10 FEET)

Ms. Frizzle said there were other vents on the ocean floor.

"Unfortunately, we don't have time to visit them," she added.

Then she pulled up a lever on the dashboard, and the bus zoomed toward the surface.

THOSE NERMS LOOK JUST LIKE SPAGHETTI.

DID WE HAVE LUNCH?

PLEASE. I JUST LOST MY APPETITE.

THAT DANDELION ANIMAL IS LIKE A LITTLE FLOWER!

DANDELION ANIMAL (2 INCHES)

MATS OF BACTERIA (30 INCHES THICK)

SPAGHETTI WORMS (UP TO 2-3 FEET)

• WHEN THE FIRST VENTS WERE FOUND

by JOHN

The first vents were discovered in the 1970's and 1980's. Before then, ocean scientists had never seen large animals like these on the deep ocean floor.

HOW IS A CORAL REEF BUILT? by Amanda Jane

- Each coral polyp grows a stony skeleton around itself. The reef is made of a layer of living coral animals attached to a wall of many millions of dead skeletons.



Actual sizes of typical coral 5 yrs



Each "pock mark" is a single coral animal

HOW CORAL POLYPS EAT

by Rachel

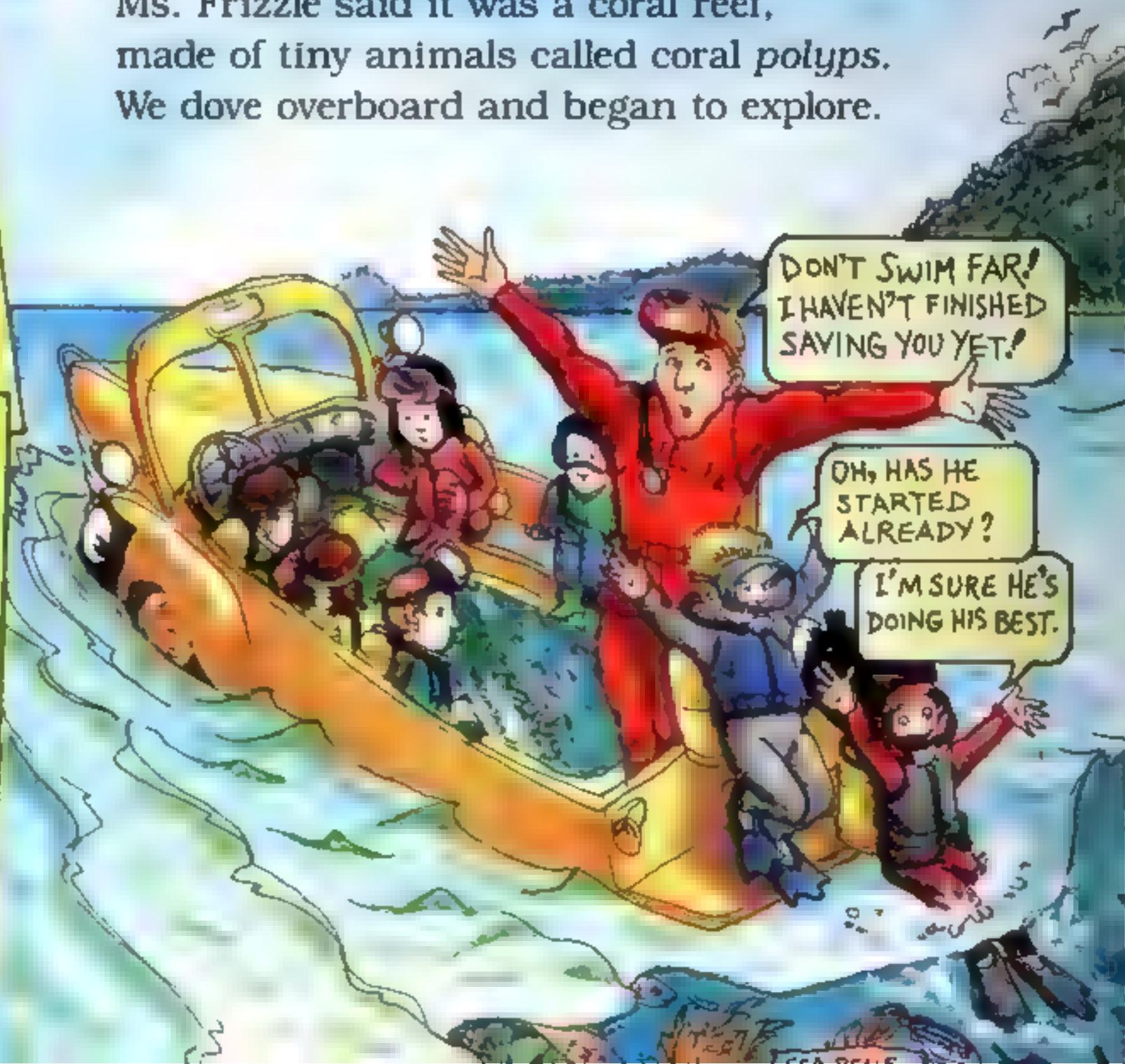
- Most corals feed at night. Tiny arms come out of a coral's stony skeleton. The arms catch plankton and pass it into the coral's mouth.



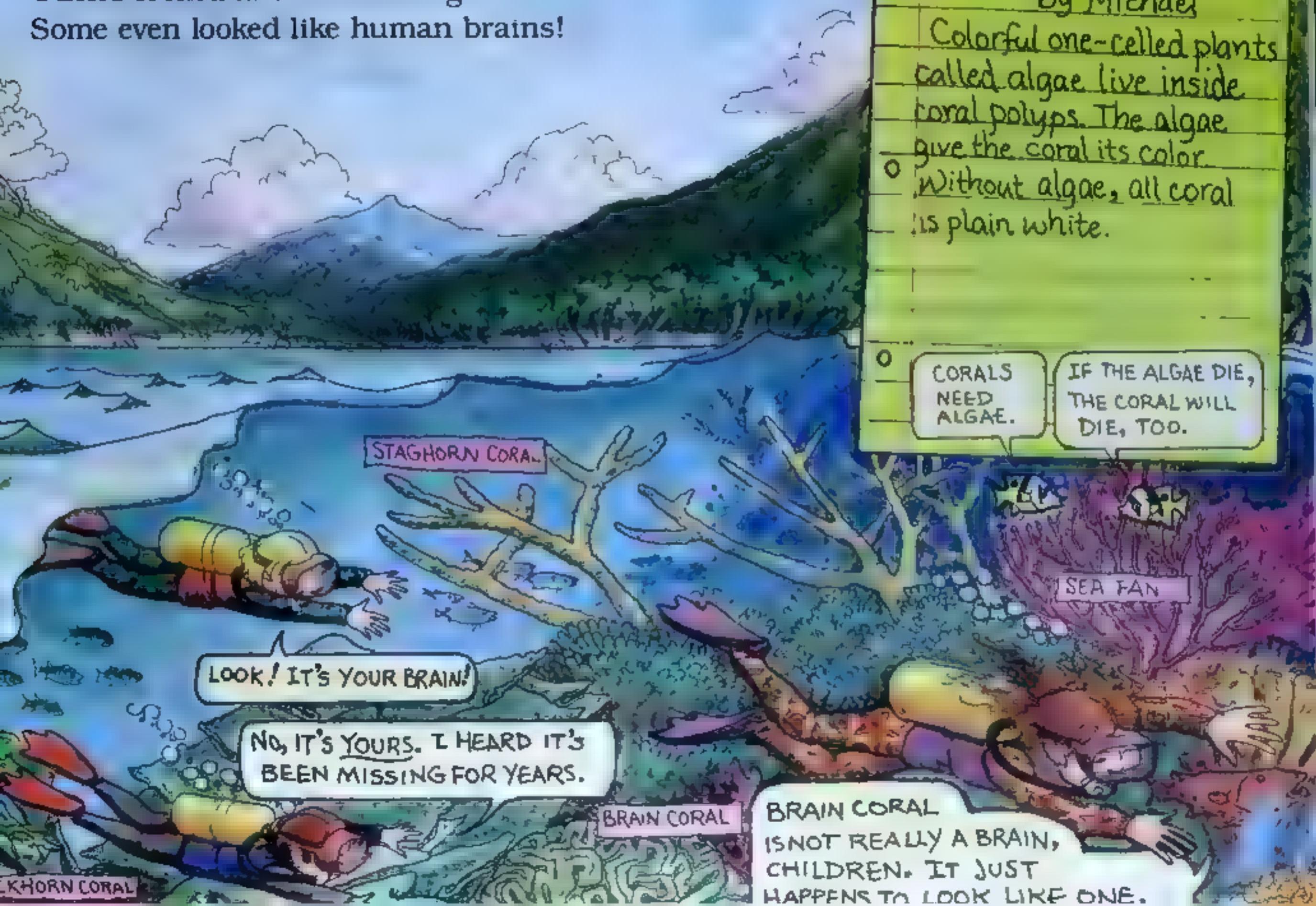
Soon we were motoring over the open ocean toward a sun-drenched island.

The bus had changed into a glass-bottom boat. Through the glass, we saw what looked like a wall made of colorful rocks.

Ms. Frizzle said it was a coral reef, made of tiny animals called coral polyps. We dove overboard and began to explore.



The reef was made of many different kinds of corals.
Some looked like trees with branches.
Others looked like fans or fingers.
Some even looked like human brains!



WHAT GIVES CORALS THEIR COLORS?

by Michael

- Colorful one-celled plants called algae live inside coral polyps. The algae give the coral its color.
- Without algae, all coral is plain white.

CORALS
NEED
ALGAE.

IF THE ALGAE DIE,
THE CORAL WILL
DIE, TOO.

THREE KINDS OF CORAL REEFS

by Tim

- 1. A fringing reef is attached to the shore.

TOP VIEW SIDE VIEW



- 2. A barrier reef has a channel of water between it and the shore.



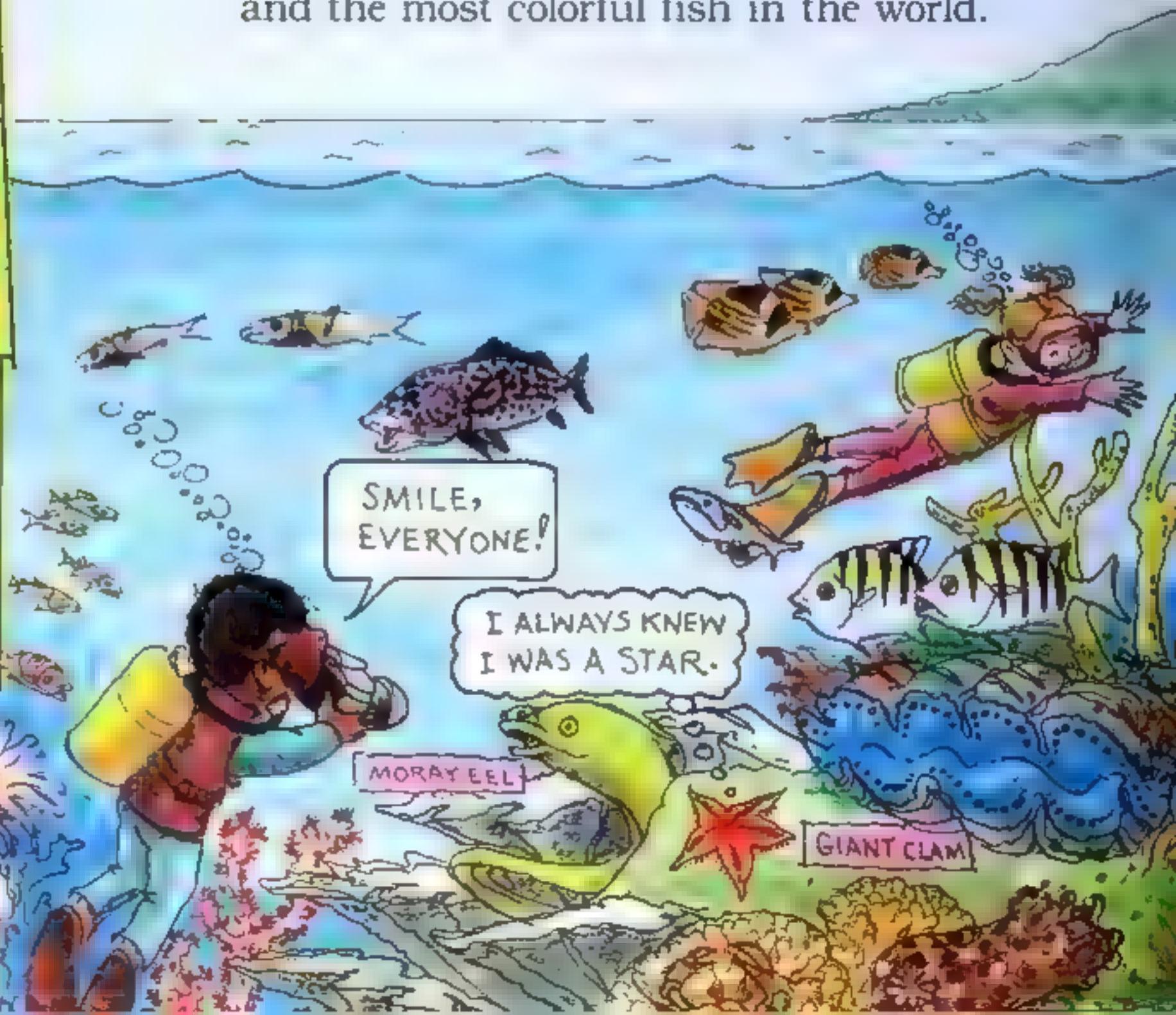
- 3. An atoll is a ring of coral around a sunken volcano.



MR. FRIZZIE AND THE
KIDS ARE ON A FRINGING REEF

"A coral reef makes a good home for many ocean plants and animals," said the Friz.

We saw crabs and lobsters, huge eels and octopuses, slimy sea slugs and spiny sea urchins, and the most colorful fish in the world.



Too soon, Ms. Frizzle said it was time to go.
No one wanted to be left behind
so we all climbed aboard.
Frizzie stepped on the gas,
and the bus chugged away from the coral reef.

DON'T WORRY KIDS.
WE'LL SOON BE HOME.

WHICH WAY IS HOME?

TODAY, MANY CORAL REEFS ARE IN DANGER.
PEOPLE CAN HELP SAVE THEM.

IT TOOK THOUSANDS
OF YEARS TO BUILD
THIS REEF.

PLEASE DON'T
BREAK IT...

OR
POLLUTE
IT.

BE CAREFUL
OF OUR HOME!

RIGGERFISH

SPINY LOBSTER

ANEMONE
CLOWNFISH

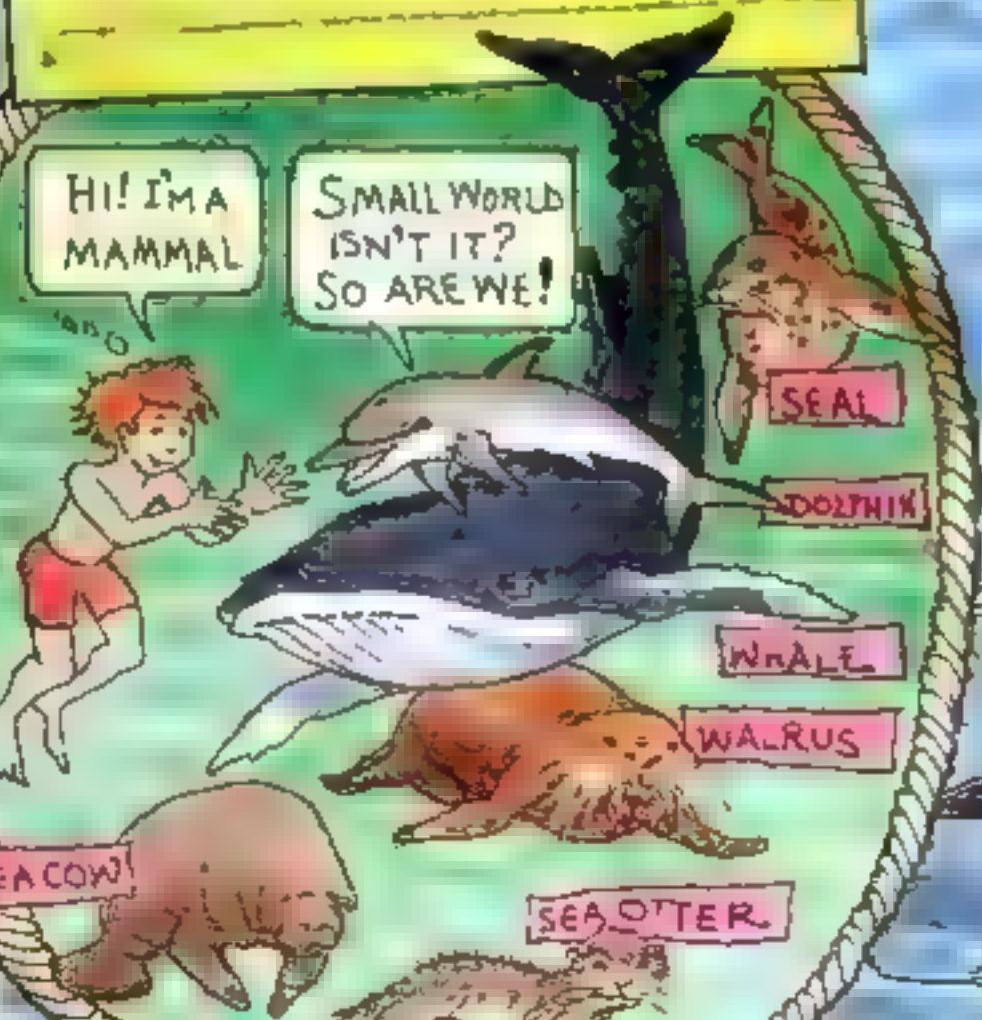
BRITTLE STAR

MAMMALS IN THE SEA

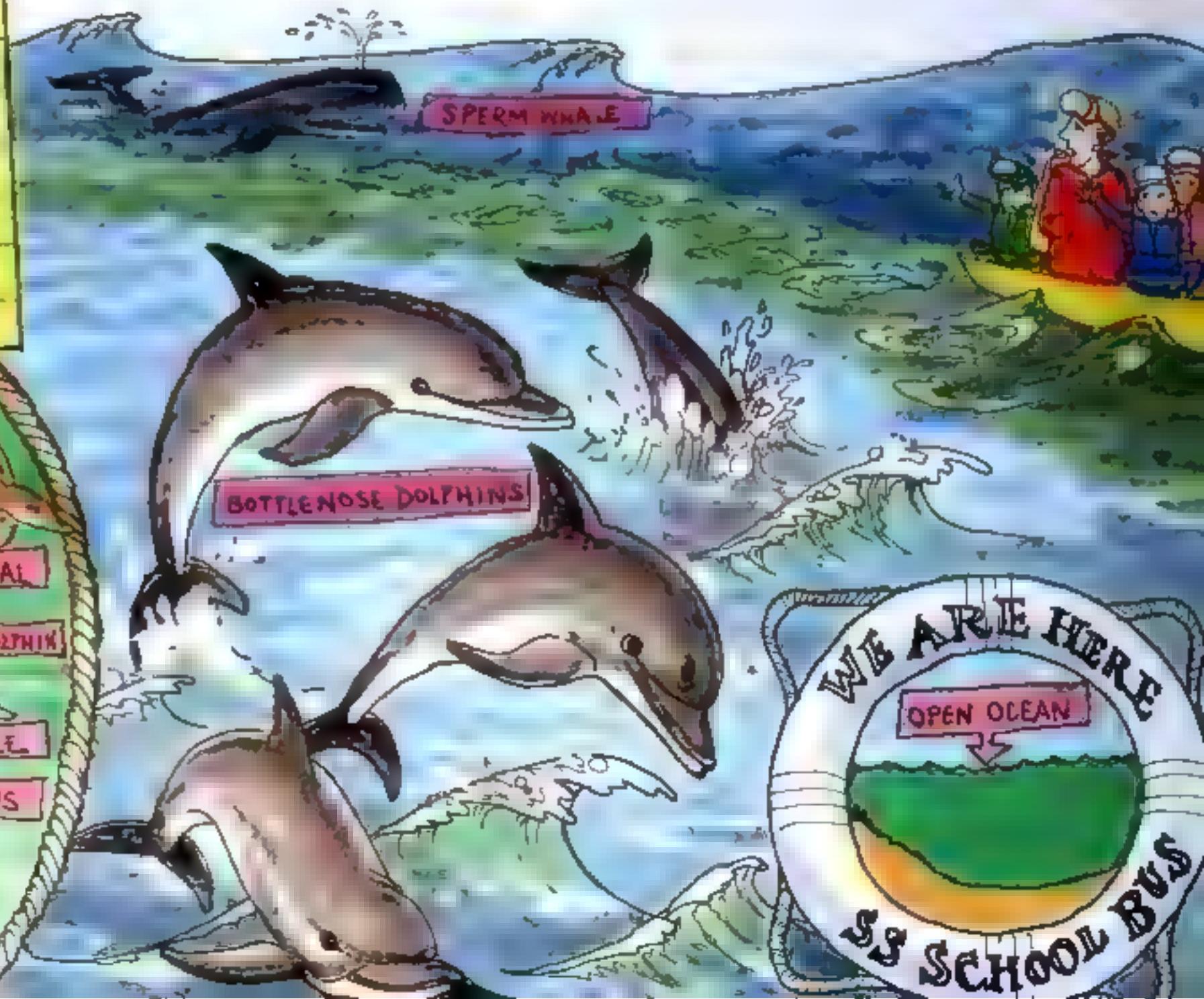
by Florrie

Animals such as dolphins, whales, seals and walruses are not fish. They are warm-blooded mammals like horses, dogs and human beings.

Most fish lay eggs but mammals do not. Mother mammals give birth to live young and feed their babies with milk.



Nearby, a school of dolphins leaped past. In the distance, we saw a whale. Everything seemed normal. Then we noticed that something weird was happening. The bus was getting flat.



As usual, Ms. Frizzle was the only one who stayed calm.

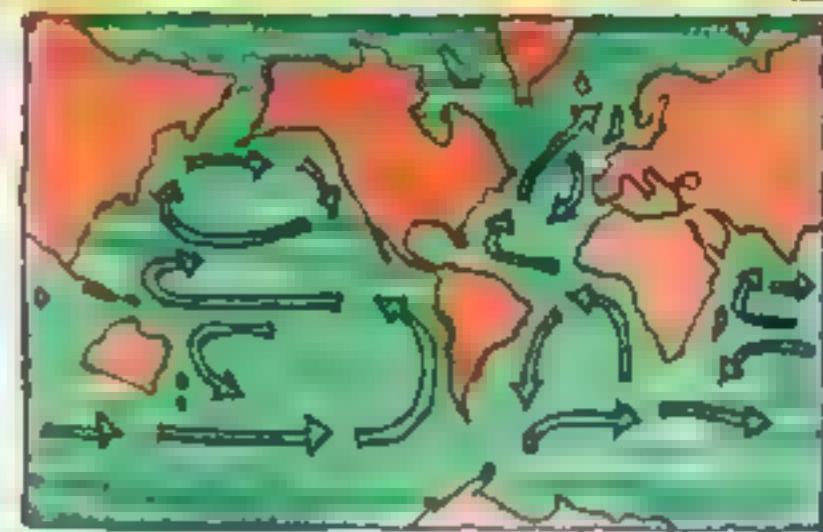
She drove us to an ocean current, and we were swept along in the fast-moving water for thousands of miles.

After a while, we saw our beach again.



RIVERS IN THE OCEAN

- o **by Phoebe**
Parts of the ocean flow like rivers. These moving areas are called ocean currents.



WHY DO BIG WAVES "BREAK" NEAR SHORE?

by Carmen

- In shallow water, the ocean bottom drags on the lower part of the wave and slows it down.
- The upper part keeps going fast, so it falls over, or breaks.

TOP KEEPS
GOING FAST

BOTTOM
SLOWS
DOWN

"Everyone stay on the bus!"
shouted the Friz.

On the bus was right.
It had turned into a giant surfboard!

THIS IS THE GREATEST
RESCUE OF MY CAREER.

CONGRATULATIONS, LENNY!

PELICANS

WE KNEW YOU
COULD DO IT!



We had to stand on top of it.
And we were riding a wild wave
straight toward shore!

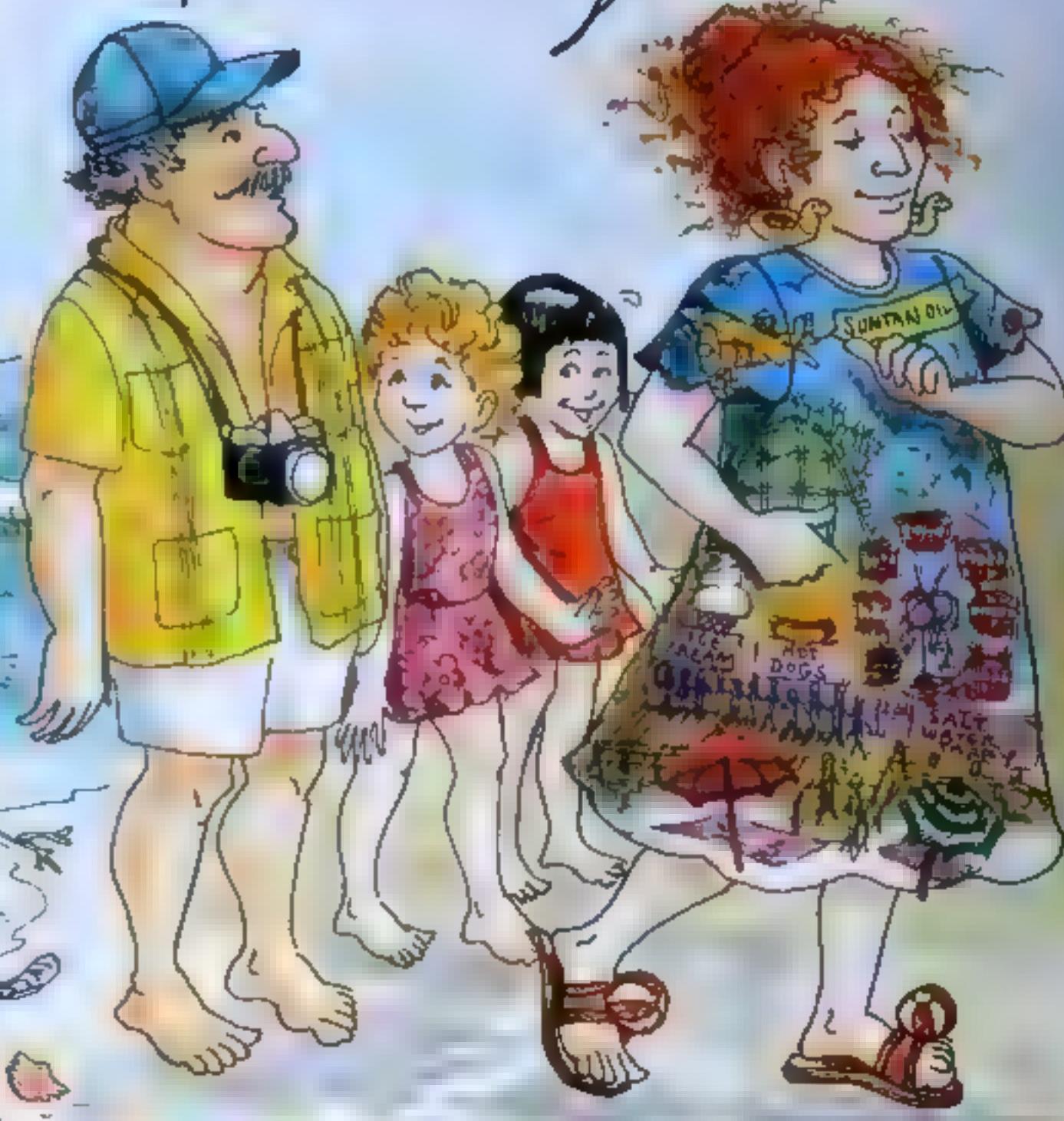
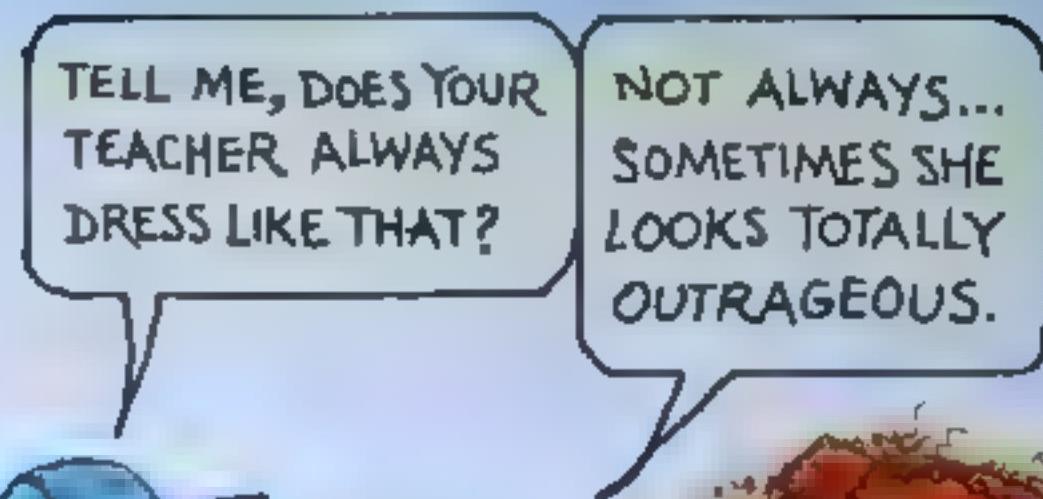
Hooray! We're surfing.

Cowabunga!

Hang ten, class!

Could I just
hang one?

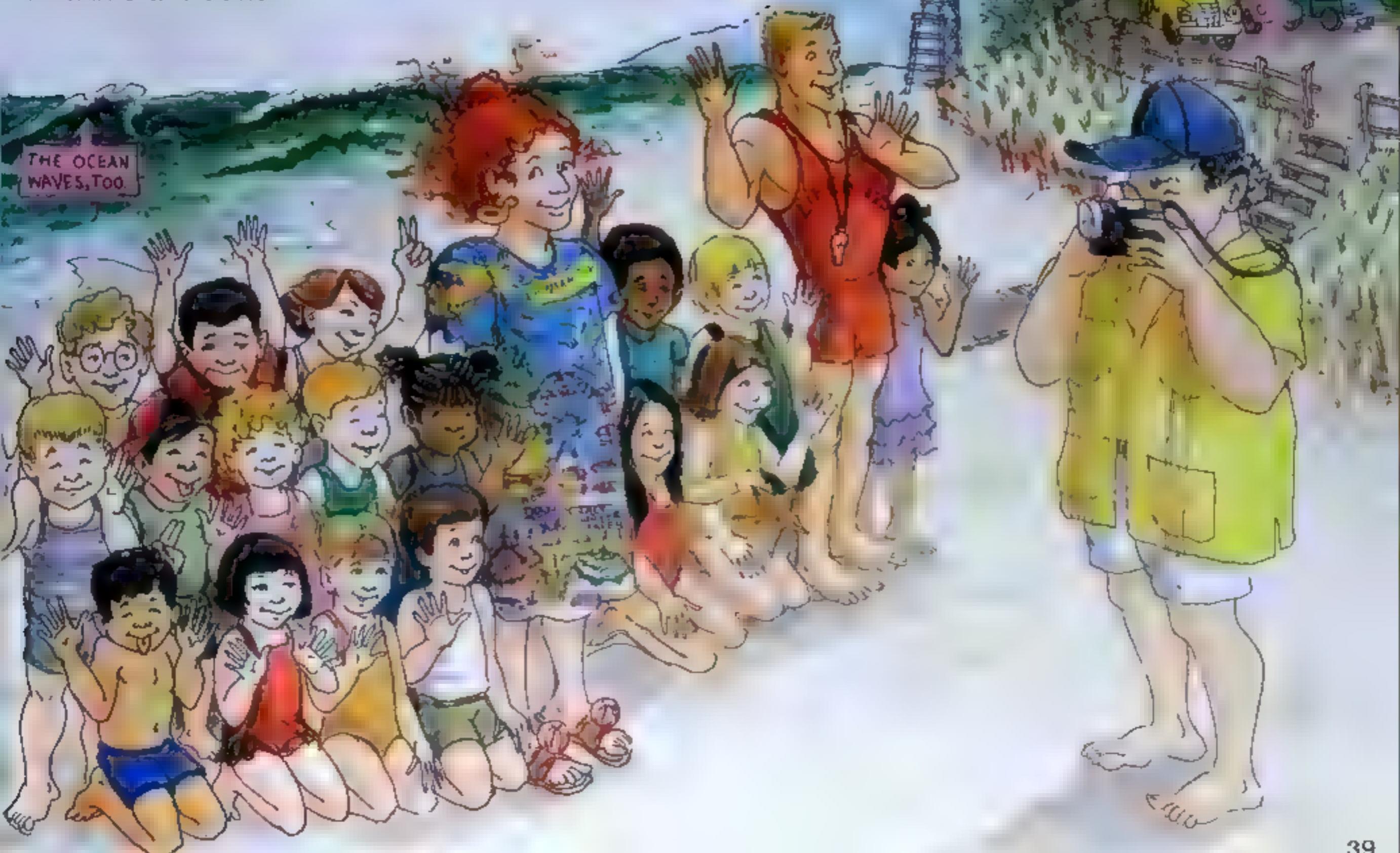
Oh, no! It was a giant wipeout!
The whole class went under.
The next thing we knew,
we were washing up on the sand.



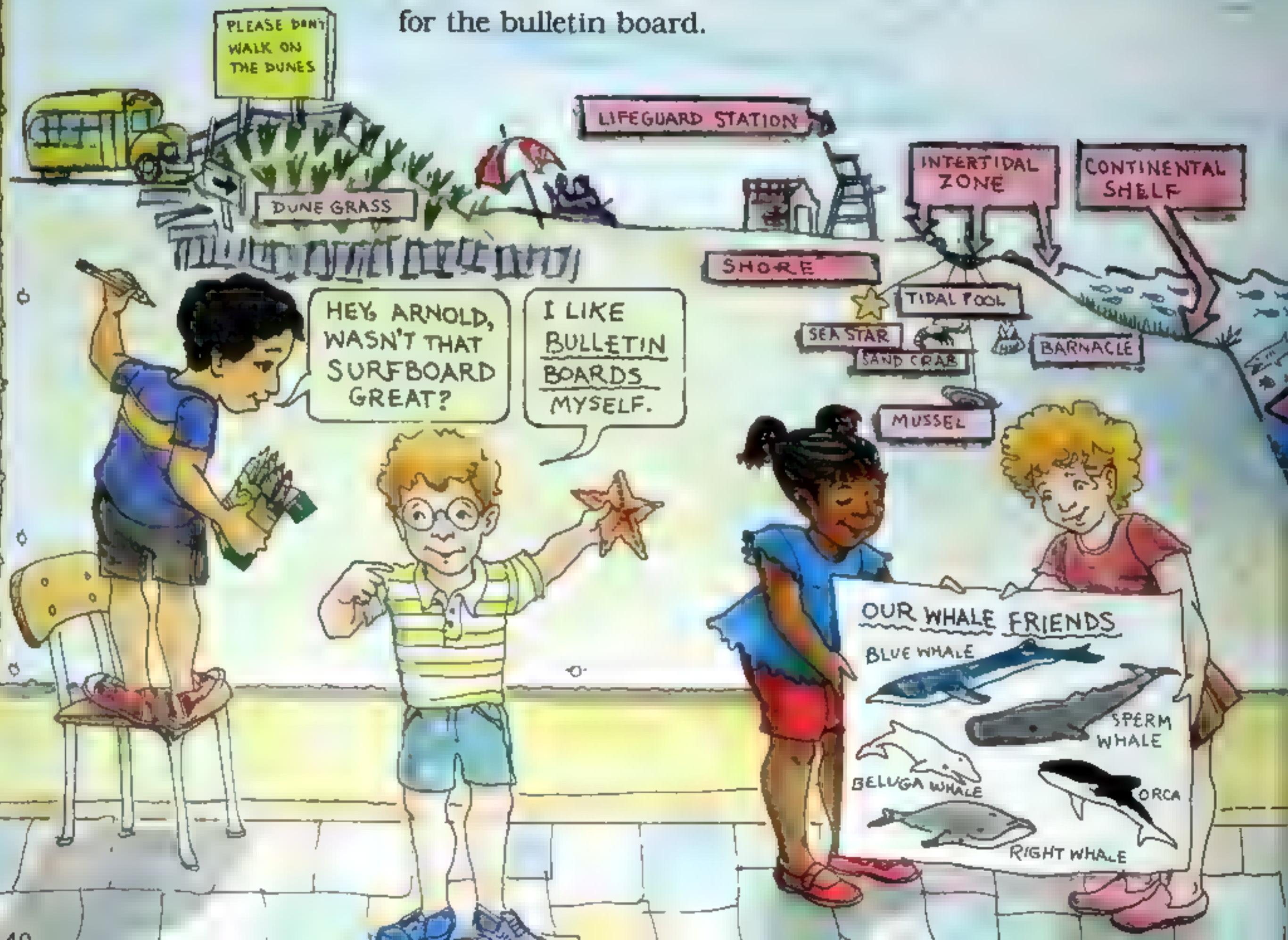
Our diving suits were gone,
and the bus was its old self again.
There it was, sitting in the parking lot
as if nothing had happened.
We thanked Lenny for everything
and hit the road.

COULD YOU TAKE A
PICTURE, PLEASE ?
I'VE NEVER SAVED
A WHOLE CLASS BEFORE.

OKAY, EVERYBODY.
SMILE AND WAVE.



Back in our classroom,
we made a terrific chart of the ocean
for the bulletin board.



OUR MAP OF THE OCEAN

SOME SEA BIRDS



CORMORANT



PELICAN



GULL



TERN

ISLAND



FRINGING CORAL REEF

CONTINENTAL SLOPE

DEEP OCEAN FLOOR

OPEN OCEAN

UNDERSEA MOUNTAIN

VENT BACTERIA

Dandelion Animal

SPAGHETTI WORMS

GIANT TUBE WORMS

HOT-WATER VENT

TRENCH

HEY, I'VE GOT A SAND COLLECTION!

I'M A SAND CRAB

I'M A SANDWICH



WHELK

OUR SHELL COLLECTION

ABALONE

RAZOR CLAM

COWRIE

COCKLE



OUR SEAWEED COLLECTION

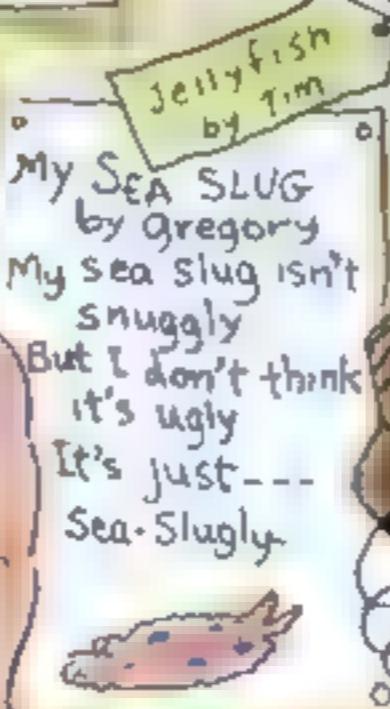
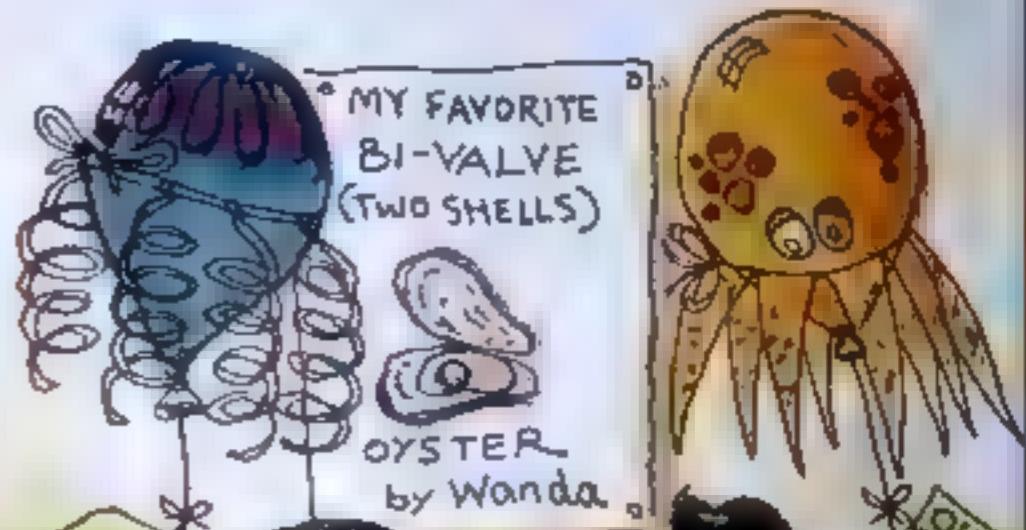


By then we were definitely ready to go home.
Thank goodness it was Friday!
After that class trip
we really *needed* a weekend off!

I'M EXHAUSTED...AND
MY DAD'S TAKING
ME TO THE BEACH
TOMORROW.

DON'T WORRY, IT'S
SUPPOSED TO RAIN.

WHEW!



OUR LETTERS TO CONGRESS

To our congressmen and women:
Please make laws to save our oceans.

Don't let people dump poisons or untreated sewage...

...or spill oil in our precious oceans!

Ocean mammals are beautiful and intelligent animals. They need our protection.

UH-OH. LOOK AT HER DRESS.

DON'T WORRY. DINOSAURS AREN'T AROUND ANYMORE.

ASK AT YOUR LIBRARY FOR MORE GOOD BOOKS ABOUT OCEANS



MULTIPLE-CHOICE TEST

FIND OUT WHICH THINGS
ARE TRUE,
AND WHICH THINGS
ARE MAKE-BELIEVE!



First, read the question. Then read the three answers — A, B, and C. Decide which one is correct. To see if you were right, check the answers on the next page.

QUESTIONS:

- 1.** In real life, what would happen if a school bus drove into the ocean?
 - A.** The bus would turn into a submarine, then a submersible, then a glass-bottom boat, and finally, a surfboard.
 - B.** The bus would stay a bus.
 - C.** The bus would turn into a rubber-ducky.
- 2.** Is it possible to explore the ocean in a single day?
 - A.** Yes, if you travel by giant clam.
 - B.** No, you couldn't do it in a day. It would take months, no matter how you made the trip.
 - C.** Maybe. It depends on how long the day is.
- 3.** In real life, can ocean animals speak?
 - A.** Yes, but only when they have something important to say.
 - B.** Yes, but too many bubbles come out.
 - C.** No. Ocean animals do not talk.

ANSWERS:

- 1.** The correct answer is B. A bus cannot magically change into anything else. It also cannot run under the ocean. Water would seep inside and the bus would sink.
- 2.** The correct answer is B. It takes a long time to travel thousands of miles through water. Even whales need months to migrate from one part of the ocean to another.
- 3.** The correct answer is C. It is true that many fish make sounds, and whales and dolphins seem to communicate in a special way. But ocean animals do not use human language, and no one has ever heard a sea star tell a joke.



